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Serum Treatment of "Shipping Fever" and Pneumonia for the British Remount Commission in America.

By J. GREGG, O.B.E., M.R.C.V.S.

I notice in your issue of the 15th July a very able paper which Capt. C. W. Cartwright read before the North Wales V.A. Capt. Cartwright was good enough to mention my work in Newport News, and the President asked for particulars. It has, therefore, occurred to me to publish it or as much of it as I can gather together, with the object of having it tested and verified by other workers, especially in our Colonies.

I have set down enough to enable other investigators to follow up our line of action.

Perhaps someone will tell us that the hay bacillus under certain conditions becomes pathogenic, and it is not at all unlikely. The only argument against that is, that it becomes more virulent with artificial cultivation.

I cannot omit mention of the help I received from Doctor Geo. Gregory, of Chicago, who was our laboratory man, also Capt. John Brown, Perth, Major Andrew Robb, Glasgow, Capt. C. W. Cartwright, Dysarth, Doctor Geo. Glover, North Carolina (late of Chester), Doctor Andrew Gillespie of Oklahoma (late of Perth), Col. Deacon, Col. Barry, Sir Chas. Gunning, Bart., and, of course, Col. Olver, and many others.

I first had the idea of using blood serum as a curative for shipping fever at Lathrop, Mo., U.S.A., in the early spring of 1915. It was surmised that recovered subjects would have a certain amount of immunity, and that blood serum from such subjects might have some curative effect if given to new purchases that were suffering from fever. It was found that the surmise was correct.

My mode of procedure was roughly to select recovered pneumonia cases that showed good constitution and grit, and bleed them from the jugular—about six quarts; defibrinate the blood, add half of one per cent. carbolic acid and inject from one to three ounces intramuscularly or intravenously, according to the symptoms. Where there was evidence of pneumonia, I usually gave the defibrinated blood through the vein.

Shortly after this I tried hyperimmunising with small quantities of blood drawn from animals suffering actively from pneumonia. I was, however, afraid to push this far enough owing to the fact that I was working without authority.

Owing to other duties my activities in this mode of treatment lapsed and it was not until the spring of 1916 that I was able to commence operations at Newport News, Va. Here I had only mules until the month of August in the same year, when I was able so extend my operations to horses. I continued to hyper with blood drawn from animals suffering from pneumonia until the end of 1916, when I was able to secure the assistance of a bacteriologist, after which we hypered with cultures of streptococci and staphylococci obtained from cases of pneumonia in the depot. Our experience was that serum from animals hypered with pneumonia blood was more potent as a curative than was that from similar animals hypered with streptococci and staphylococci, owing no doubt to the fact that the apparent causative bacillus, viz., the *bacillus X*, was in the blood used for hypering. (Col. Watkins-Pitchford was the first to name the organism.)

The records will show that the deaths dropped 75 per cent. when we started to use this serum.

This mode of treatment with fresh defibrinated blood went on at our depot until the end of 1917, when Col. A. Olver, C.B., F.R.C.O.S., R.A.V.C., took an interest in our work and obtained for it some sort of recognition. He instituted several improvements in our laboratory, fetching it up to date. He also had the *bacillus X* isolated and grown and used it with the streptococci and staphylococci for hyper-immunising purposes.

Further, he had the serum standardised by the agglutination method, so that we were able to gauge the potency and to balance the dosage. But the greatest improvement of all was the production of a clear, filtered, and sterile product that would keep at ordinary room temperatures for a considerable time. (It was found that the defibrinated blood was not suitable for use outside the depôt of production.) Therefore during 1918 nothing but clear serum was used at Newport News or any other depôt in the States or Canada.

Personally, we found the clear standardised serum much more reliable than the defibrinated blood; our records and that of others will bear this out. We also had considerable experience with the polyvalent serum as a prophylactic; in our hands and in the depôt in which we were operating the saving was from 50 per cent. to 75 per cent. over the controls which had no prophylactic treatment. I have

no doubt but this would have held good if the animals could have been kept longer in our depôt, but it looked as if the immunity produced was short and that when the animals were again compelled to take on a further rail journey they became again infected and when getting a second dose of serum developed anaphylaxis, which was often fatal. The same condition was noticed when animals got a second dose of serum several weeks after the first dose and before undertaking their second journey.

Our system of using defibrinated blood and serum at Newport News was always to get the animals under treatment early. Immediately they came off the train experienced men picked out all the "dopy," empty-looking or sick animals and removed them to the hospital lines where they could get some individual attention and a dose of serum. Their temperatures were taken daily and the serum repeated once a day for three days if required. Pneumonia cases were sent to special pens and given whatever treatment was indicated, including serum, chest tapping, bleeding, and normal salt solution intravenously. Counter-irritation over the chest walls in all forms was abandoned after thorough trying. We usually got 25 per cent. of train loads of horses into the hospital lines by the ordinary careful picking. Afterwards, when the D.D.V.S. introduced the temperaturing of train loads, 45 per cent. came under treatment and got serum. This method we found cut the death rate to a mere trifle even in the very sick train loads. We had the smallest death-rate in the history of the Commission after introducing this method of treatment.

During 1918 our laboratory produced 43,000 ounces of clear serum, which was distributed to the depôts in the U.S.A. and Canada. The market value of this product at wholesale price would be $43,000.

We now come to the particulars of the laboratory methods employed. The first investigative work undertaken in the laboratory was directed towards solving the relationship between the pus organisms and catarrhal fever and pneumonia. This work covered a period (working part time) of five months, from November, 1916, to the end of March, 1917, during which time numerous blood cultures and bacteriological examinations of *post-mortem* material from pneumonia cases were made. The outstanding feature of this investigation was that all varieties of streptococci and staphylococci were found with no one type any more constant in one form of the disease than another.

Taking the streptococci found in pneumonia as an example, their cultural characteristics and pathogenicity were exceedingly variable, both long and short chained varieties, hæmolytic, and the conglomerate forms were all equally prevalent. Freshly isolated cultures of the long chained streptococcus which were highly virulent to rabbits, produced little or no effect when injected into horses and mules. One example—a blind horse which had not been sick with catarrhal fever or its complications while at Newport News was first bled about one gallon, and received six different strains of freshly isolated streptococci 30cc., into the jugular, the same amount into the trachea, and the same amount directly into the lung substance through the costal wall. This horse had a slight rise of temperature, lasting over a week, after which the animal appeared normal up until the time of his destruction, which was about four months later, as during this period he was used as a serum animal.

Staphylococci.—All three forms of staphylococci were present both in pneumonia and catarrhal fever, with the staphylococcus pyogenes aureus most common, the albus next and the citreus last. The staphylococcus citreus flavus (waxy form) was also isolated in catarrhal fever. Some cultures of the staphylococcus albus assumed golden pigment properties under artificial cultivation.

The starting point was to make a close and thorough survey of catarrhal fever in an effort to solve the question of ætiology, and the relationship between fever cases where the schneiderian membrane (coryza) and mucous membrane of the eye (pink eye) were involved, and strangles, the intestinal type (diarrhœa cases), and the pectoral type of pneumonia.

Bacteriological Investigation.

Numerous blood cultures made from the blood stream during life, and from the various tissues after death revealed the fact that an organism (very closely resembling the *bacillus subtilis*) is more constant than any other one organism, when the media is made with fresh horsemeat infusion. Out of a total of ninety-four examinations, forty of which were cararrhal fever and the other fifty-four were pneumonia cases, the following results were obtained :—

	Per cent.
Pneumonia Cases—	
Bacillus X in mixed culture	60
Bacillus X in pure culture	41
Micrococci in pure culture	19
Other organisms	8
Sterile	15
Catarrhal Fever (Shipping Fever)—	
Bacillus X in mixed culture	47.5
Bacillus X in pure culture	40
Micrococci in pure culture	22.5
Sterile	25
Other organisms	5

The above blood samples were taken by the McJunkin tube method, which would almost exclude contamination from the air or skin. The skin was first nicked, after which the needle was passed into the vein and the blood run into 1.5 per cent. solution of ammonium oxalate, which exerts no deleterious action on any bacteria which may be present, and prevents the blood from clotting.

Cultural Characteristics.—The *bacillus X* is a large organis maveraging 7 x 1.25 microns, having partially rounded ends, occurring in chains, both in the tissues and on artificial media, on the latter growing out in the form of long threads. It is actively motile with a sluggish worm-like motion. It forms spores very rapidly, which are central, and of the same diameter or only slightly larger than the

bacillus. This bacillus is Gram positive and stains well and uniformly with all the ordinary stains. It is aerobic and a facultative anaerobe with the largest colonies at the bottom of a glucose agar stab.

On agar made from horse meat infusion, it grows very rapidly, spreading over the entire surface, grey-white in colour with a dull glistening surface, which is thrown up into folds after the growth is a week or so old; the edge is plamentus.

No gas is produced in either glucose or lactose media.

Milk is slowly and incompletely coagulated with a slight acid reaction, later the coagulum is digested.

Gelatin is rapidly liquefied.

No indol is produced.

Blood serum is rapidly liquefied or digested.

No exact classification has been completed, but from the above, it will be seen that this bacillus very closely resembles the *bacillus subtilis*, to which group it undoubtedly belongs.

Pathology.—In making *post-mortems* on numerous pneumonia cases over an extended period of time, only one type of pneumonia has been encountered—namely the catarrhal or lobular type.

Septic or gangrenous pneumonia is a modification of the above type, due to an interruption in the circulation to areas of the lung tissue into which saphrophytic organisms find their way and are then able to develop. The foul odour from the nose is not always present in septic pneumonia cases.

Following a period of congestion, the anterior lobes seem to be first affected, with these areas spreading backwards and upwards as the disease progresses; quite frequently a sero-fibrous exudate is thrown out into the pleura and may extend to the pericardium and to the costal pleura. This is unorganised, yellowish, gelatinous in appearance, and may be an inch or two thick. In some cases it is more of a purulent nature, when it is cheese-like in consistency. Along with these conditions, there is generally an abnormal amount of fluid in the chest, varying from a few litres to several gallons. Under these conditions the lungs are generally atrophied. Involvement of considerable areas of lung tissue may occur without any exudative changes on the pleura. All stages of pneumonia may be found in such a lung; congestion red and grey hepatization, to areas that are clearing up.

That a severe toœxmia is present in bi-lateral pneumonia cases is indicated by the petechiæ and suggulations beneath the serous membranes of the heart, especially the left ventricle. There is also a pronounced cloudy swelling of the liver and kidneys. The alimentary tract is sometimes involved, generally the large colon which is covered with petechiæ and suggulations.

Sequelæ.

A frequent sequel in very severe attacks of bi-lateral pneumonia is an acute tendonitis, the most common seat being tendon sheaths and bursæ of the fetlock region, in which it may affect one or all four legs. In seven cases where the fluid was aspirated from an inflamed tendon sheath or bursa for bacteriological examination, the following results were obtained:—

Bacillus X in pure culture ...	1 case.
Bacillus X mixed with pus organisms	2 cases.
Streptococci in pure culture ...	2 cases.
Staphylococcus aureus in pure culture	1 case.
Strepto and staphylo citreus ...	1 case.

An acute tendonitis has been produced six times by injecting live cultures of the *bacillus X* into the blood stream. In only one case was the *bacillus X* recovered in pure culture, and in two others it was associated with the staphylococci or the streptococci, although the animal had never received any injection of the last two. The injection of very large doses of either streptococci or staphylococci has always failed to produce a tendonitis (injected into jugular).

A complication sometimes appearing towards the end of a severe bi-lateral pneumonia case is an emphysematous condition of the subcutaneous connective tissue. It generally starts in the region of the head and neck, and extends back along the withers, dorsal regions, sometimes over the costal surfaces and round the pectoral muscles, and the loose tissue, about the mammæ or penis up to the perineal space. The subcutaneous tissue slowly fills with gas until the skin may be distended for a depth of from two to three inches. The process seems to be painless, the pressure apparently anæsthetising the cutaneous nerves. Only two cases have occurred at Newport News, in 1918, and bacteriological examination of section of the subcutaneous tissue revealed the *bacillus mucous capsulatus* in pure culture in both cases. Repeated blood cultures from the jugular failed to detect this bacillus fn these two cases. This same bacillus has, however, been found in the blood stream of pneumonia cases in which no emphysematous condition developed. This organism is a faculative anaerobe, and a fairly good gas producer, so would answer the necessary requirements to produce these symptoms.

Agglutination.—The *bacillus X* is the only organism which shows a constant agglutination towards the blood serum of recovered catarrhal fever and pneumonia cases. The agglutination index is of gradual ascension following the introduction of *bacillus X* or its toxins. The blood of animals suffering from pneumonia has the same effect, and the peculiar fact is that the agglutination index of the animal is generally higher than that of the animal from whom the blood was drawn. The above phenomenon can not be explained on the grounds of mechanical transference of anti-bodies. The macroscopic method was used almost entirely. Dilutions from 1/20 to as high as 1/1,638,800 were tried on the hypered horses with definite reactions; but the last tube was a very weak agglutination. The precipitate formed in dilutions below 1/1000 were always quite firm, and hard to disintegrate with the supernatant fluid clear in the case of hyper immune horses.

Hypering.—In producing an antitoxin to the bacillus some little trouble was encountered at first,

due to the susceptibility of both the horse and the mule to the live bacillus and its toxins even in small doses. After using both live and dead cultures over considerable periods of time the use of live cultures only appears to be the best. The equine species is apparently more susceptible to the toxins or to the foreign proteids contained in the dead bacilli which cause a reaction of anaphylactic nature, than to infection from the live bacillus.

The method finally adopted in cases where all the animals were of strong conformation, and agglutinated the *bacillus X* at least 1/320, was to start hypering with a 10c.c. dose of a 12-hour bouillon growth of live *bacillus X*. This was repeated every three days until the thermic reaction had ceased, which is generally about the fourth dose. A week later a 15 c.c. dose of either dead streptococci or staphylococci was given intravenously. The dose of *bacillus X* was increased 5 c.c. at the end of each series of three or four injections ; and the streptococci and staphylococci 15 c.c. until the subject could take a 30 c.c. dose of *bacillus X*. The agglutination index (at the end of three months) should be between 1/10,000 and 1/25,000 in good serum animals. Trial bleedings were made from time to time at each animal after the last hypering ; if an animal agglutinated the *bacillus X* in dilution as high as 1/10,000 he was considered hyper-immune, and in condition to bleed.

Bleeding—Each hyper-immune animal was bled two gallons at a time for three consecutive bleedings, one to two weeks apart after which he was allowed to rest for a period of six weeks before starting to re-hyper.

In collecting and handling the serum everything coming in contact with it was carefully sterilized in the autoclave—15 pounds pressure for thirty minutes—and all operations conducted with scrupulous aseptic care in order to avoid contamination. The whole side of the neck, head, and shoulder was prepared in the usual way, and a tourniquet applied to the neck so as to distend the jugular, after which the skin was nicked, and a sharp pointed cannula passed upward into the vein. From six to eight litres was drawn from each animal through rubber tubing into long glass jars which had a capacity of two litres. The blood should flow in a continuous stream, since a slight or interrupted flow prevents a proper separation of the serum. The red blood corpuscles should gravitate to the bottom of the clot. As the tubes were filled they were placed in a warm chamber at or just below 30 C. for six hours, after which they were placed at refrigeration temperature for 24 hours. At the end of this time weights were released upon the clot, which squeezed out the serum in about 24 hours, after which the syphoning took place. An average yield of about 75 per cent. clear serum was obtained by this method. The syphoning into the final containers was carried out in a specially constructed bottling room in which there were no large air currents. The mouth of the container was further protected by an inverted four-inch glass funnel, which was attached to the filling tube. All serum was put through an infusorial earth or unglazed procelain filter (bacteria proof) under negative pressure. Five-tenths of 1 per cent. carbolic was added as a preservative. Just before the last of the serum was run off, a large bottle (30 c.c.) was drawn off into a sterile test tube which was used for testing the sterility of the serum. This put a check on all operations and handling of serum up to this point, and if the final containers were sterile the serum in them must be sterile (containers were always given 15 lbs. pressure for 45 minutes in the autoclave). These test tubes, which contained the serum for testing, were placed in the incubator for 24 hours, and then left for several days at room temperature, so that if any organisms were present they would multiply and be more readily detected.

Kinds of serum.—Serum X was produced from animals which were only hypered with the *bacillus X* in live culture. Very little of this serum was used.

Serum P was produced from horses and mules which received the regular hypering with *bacillus X* and in addition received killed cultures of the various strains of streptococci and staphylococci that had been freshly isolated and were virulent to rabbits. The cultures were killed by heating at 55 C. for half an hour.

Serum G was entirely an anti-streptococci and an anti-staphylococci serum, and the animals used to produce it were hypered with many strains of the above two organisms.

Toxins of Bacillus X.

The *bacillus X* produces a true powerful toxin, that is a soluble or extra-cellular toxin. This is secreted directly into the tissues or on to artificial media as the organism grows. The toxin was produced by growing the bacillus X in horse broth for two weeks at body heat in large flat flasks. The toxin was obtained by passing the culture through a Berkefield B filter. A three c.c. dose of toxin will almost invariably produce some toxic symptoms in the heavier class of horse ; eight c.c. is generally fatal to all types of horse as well as the mule. In the latter case in about half an hour the animal would become uneasy and take on an anxious expression, Muscular tremors of all the superficial muscles, in some cases quite pronounced, the animal soon attempting to lie down, but it would fall down and be unable to regain its feet, due to lack of control of the hind limbs. The temperature in some cases would rise six or seven degrees and the heart rate was invariably greatly accelerated. The injected animals would defœcate two or three times inside the first half-hour. When led out the animals had a stumbling, unsteady and wandering walk, due to the action of the toxin on the nervous system. Washed suspensions of the *bacillus X* or its spores produced no marked visual disturbance even in good-sized doses.

A typical clinical picture of pneumonia could be produced by injecting 5 c.c. of toxin over several hours. The rapid breathing or " blowing," along with a slight mucus discharge from the nostrils and accelerated pulse, were noted.

In experimenting on animals that were to be destroyed by giving large doses of *bacillus X* toxin some interesting facts were noted in those animals which did not succumb for a week or two. About 25 per cent. developed acute tendonitis, and several became partially paralyzed behind—paraplegic cases. In several such cases spinal fluid was aspirated through the atlo-axoid space but without getting cultures except in one case, when a diplococcus was isolated. Although there is no conclusive evidence to support this view, paraplegia cases are undoubtedly due to the action of *bacillus X* toxin on the cord (causing a sclerosis of the posterior and lateral columns of the cord), as this condition was set up when an overdose of the toxin was administered, and generally progressively got worse.

When hypering horses with live cultures of *bacillus X* a few fatalities occurred, due to the large amounts of free toxin present in the cultures used.

Habitat of the bacillus X.—Numerous attempts were made to isolate the *bacillus X* from dirt in the stock pens, scrapings from the stalls, mangers, and from hay infusion. This material was greatly diluted, plated out, and the colonies resembling the *bacillus X* were sub-cultured. These cultures very closely resembled the *bacillus X* in all cultural characteristics except that of its digestive or proteolytic powers. The method finally adopted for differentiating was the power of these organisms to agglutinate *bacillus X* serum. No organisms were isolated that could do this.

The Urinary Organs of the Dog.

By B. Gorton, M.R.C.V.S.

The Kidneys.

The kidneys are dorsally placed in the abdominal cavity, held in position by the peritoneum, and generally surrounded by a quantity of adipose tissue. In shape the two kidneys resemble each other, being bean-shaped, with two surfaces, two borders, and two extremities. The surfaces dorsal and ventral are smooth and convex, the latter being more pronouncedly convex than the dorsal, which are somewhat flattened against the psoas muscles. The lateral border of each kidney is convex in its length, and rounded, whilst the medial border is concave about its middle, the depression marking the position of the hilus, the point at which the vessels, nerves and ureter pass to and from the organ. The extremities are rounded.

With regard to their position, relations, and attachments, the kidneys differ considerably. The right kidney lies under the upper end of the last rib and the first two lumbar vertebræ. Nearly all the anterior half of this kidney rests in the renal fossa of the liver, which helps to keep it in place. The part of the ventral surface which is not in contact with the liver is related to the duodenum laterally, and to the right branch of the pancreas. It is separated from the cæcum by the mesoduodenum. The dorsal surface is in contact with the psoas muscles and the edge of the diaphragm. The lateral border touches the abdominal wall. The medial border may be in contact with the posterior vena cava, or it may be separated by a slight interval. It is also related to the right adrenal, and to the renal vessels and the ureta.

The left kidney is opposite the second, third and fourth lumbar vertebræ, being placed further back than the right, in such a fashion as to bring the hilus of the right on a level with the anterior extremity of the left. This difference in position is sometimes more marked, as the left may be pushed back by the distended stomach. In this case the posterior end of the right may be level with the anterior pole of the left. This tendency to be displaced exhibited by the left kidney is due to its method of fixation. Whilst the right is held in a secure position by peritoneum and by its relationship with the liver, the left is supported in a rather loose manner by the peritoneum, which may be said to form a short mesentery for it. This loose suspension gives it a rather indefinite position, and this fact must be borne in mind during examination of the abdomen by palpation.

Dorsally the left kidney is related to the psoas muscles, and partly to the abdominal wall. Ventrally it is in contact with the descending colon. Its lateral border is against the wall of the abdomen and is embraced by the spleen. The medial border is related to the renal vessels and ureter, but is sometimes separated from the aorta by a considerable interval. This interval varies in width according to the pressure exerted by surrounding viscera. The anterior extremity touches the stomach. In the bitch the posterior extremity of each kidney is connected to the corresponding ovary by means of the mesovarium. In the operation of ovariotomy through the flank the kidneys form reliable landmarks.

The kidneys of a medium-sized dog measure about $2\frac{1}{4}$ inches long and $1\frac{1}{4}$ inches broad. Each weighs about 2 oz.

Structure: The surface of the kidney is covered by a thin fibrous capsule which is easily stripped off. Certain pathological conditions which are commoner in dogs than in the larger animals render the removal of the capsule more difficult, whilst other conditions cause the connection between the organ and the capsule to be less intimate. The capsule is continued into the sinus, a cavity in the kidney substance, the position of which is shown by the hilus, and which lodges the dilated extremity of the ureter, the pelvis. In the sinus the capsule is continuous with the sheaths of the renal vessels and ureter.

On examination of a horizontal section the kidney substance is seen to be made up of two main portions, the cortex and the medulla. The cortex is the external layer, and is reddish-brown in colour and granular in appearance. This appearance is due to the presence of the Malpighian corpuscles. The medulla, striated radially, is paler in colour than the cortex. Between the cortex and medulla there is an intermediate or boundary layer, which shows the cut extremities of fairly large blood vessels. The

inner part of the medulla is paler than the remainder and projects as a concave ridge, the renal crest, into the pelvis. It is upon the renal crest that the renal tubes open into the pelvis.

Blood and nerve supply.—The kidneys receive their blood by the renal arteries, branches of the aorta. The right artery crosses the posterior vena cava dorsally, and is longer than the left. The veins drain into the posterior vena cava, the left vein being central to the aorta. The nerves are derived from the sympathetic system.

The Adrenals.

Associated with the kidneys are two ductless glands, the adrenals or supra-renal capsules. These are somewhat elongated bodies about three-quarters of an inch long, with pointed extremities. The right is usually broader than the left, and is situated between the vena cava and the right kidney, in front of the hilus. The left is in contact with the aorta and does not touch the kidney. Each bears a transverse groove ventrally, which accommodates a vein coming from the dorsal edge of the diaphragm and the neighbouring part of the abdominal wall. On section the adrenal shows a pale cortical zone, and a darker and softer medulla.

The Ureters.

These are the excretory ducts of the kidneys. Each begins by a dilated extremity, the pelvis, into which the renal crest projects, and which is placed within the sinus. It emerges from the hilus, and curves backwards between the renal artery dorsally and the vein ventrally. The right passes backwards on the ventral face of the small psoas muscle and with the vena cava to enter the bladder near the neck. The left behaves similarly, but is related to the aorta. In the male the ureters cross the vasa deferentia near the pelvic inlet. In the female they run in the dorsal edges of the broad ligaments of the uterus.

The Urinary Bladder.

The bladder varies considerably in size according to the quantity of urine which it contains. In the contracted state it is a fairly dense pyriform mass not much more than an inch long, lying immediately in front of the pubes. When distended it may extend as far forwards as the umbilicus, and hold nearly a pint of fluid. With regard to its position it is entirely abdominal, in this respect differing from what obtains in the larger animals. The rounded anterior extremity or vertex is in relation with the small intestine, which may be displaced if it is distended. The main mass or body is related dorsally to the colon in the male. In the female the uterus or vagina intervenes between the bladder and the colon. Ventrally the body lies on the abdominal floor. The posterior extremity forms a narrow neck which is directly continuous with the urethra, and is related dorsally to the vasa deferentia in the male.

The bladder is kept in position partly by peritoneum and partly by its attachment to the urethra, which is held by connective tissue to the floor of the pelvic cavity. The peritoneum, which forms a complete coat, shows these folds or ligaments. Two of these are lateral, one on each side, and contain the umbilical arteries within their layers. These lateral ligaments in the male stretch from the bladder to the lateral walls of the abdomen at the pelvic inlet. In the female they become confused with the broad ligaments. The third ligament is central in position. It is a rather delicate fold, connecting the ventral part of the bladder to the floor of the abdomen as far forwards as the umbilicus. In the fœtus this ligament contains the urachus, the tube which puts the bladder into communication with the allantoic cavity.

The interior of the bladder is lined by a mucous membrane which is raised into folds. Near the neck and dorsal to it are seen the openings of the ureters. The triangular area of the wall, the angles of which are marked by the orifices of the ureters, and the exit of the urethra, is called the trigone, and here the mucous membrane is smooth. The ureters pass very obliquely through the wall in such a fashion that valves, which prevent the passage of urine from the bladder into the ureters, are formed. On close inspection the mucous membrane is seen to be raised into two slight ridges extending from ureteral orifices to the urethra. Here they join to be continued as the urethral crest.

Structure.—The bladder has the usual coats of hollow viscera. Externally, there is a complete peritoneal covering. The muscular coat may be divided into a superficial layer of longitudinal fibres, a middle layer of circular fibres, and a deep layer of oblique fibres. The last two form a sphincter muscle around the neck. The mucous membrane is pale and thin, and is raised into folds. It is connected to the muscular coat by a fairly loose submucous tissue. The latter is absent at the trigone, and it is due to this fact that the mucuous membrane is smooth at this point.

Blood and nerve supply.—The bladder derives its blood chiefly from the umbilical arteries, which may arise directly from the hypogastric arteries or from the internal pudic. Each umbilical artery gives off a branch to the bladder and prostate, and another to the vas deferens.

The nerves are derived from the pelvic plexus (sympathetic and sacral).

The Urethra.

In the male the urethra is common to the urinary and genital systems, and is better described with the latter. In the female it is solely engaged in the passage of urine. It is a short mucous tube, about and inch and a half long, extending from the neck of the bladder to open on the floor of the vagina at its junction with the vulva or uro-genital sinus. The longitudinal muscle fibres of the bladder are continued into the wall of the urethra as far as its termination.

The Ancestry of the Horse.

The evidence of their abundant remains shows that the old world has been inhabited by true horses ever since the Glacial Age—horses having all the characteristics of those we now see, except size. To these prehistoric (rather than fossil horses many specific names have been given by naturalists, but it is now conceded that these divergencies in structure indicate only the efforts of differing kinds of country, or climate, and that substantially it was one and the same animal from Spain to Kamtchatka. Three types are recognised.

Oldest and most original is the "steppe" race, which spread over the treeless uplands which, at the close of the last glacial epoch, extended over much of north-eastern Europe as well as throughout central Asia. It is the remnants of this primitive race, first brought to notice by Col. Nicholas Przhevalski in 1881, which still exist in the tarpans of the Gobi Desert. Captive specimens may now be seen in New York and in some other zoological gardens. They stand about twelve hands high, are uniform dun in colour, have a large head with a convex profile, no forelock, and in the winter a decided beard; a short neck bearing a naturally roached mane; short back, rather heavy limbs, and a tail scantily haired on the upper half.

From this basis there was developed by the different conditions on the hot, dry plains of south-western Asia a second, or "desert" type, somewhat smaller than the steppe horse, with a smaller head, narrow face, straight profile and slender limbs; and unquestionably it is from this type that the general stock of horses of the present day was derived.

The third or "forest" type was evolved when the treeless tundras and plains left by the great glaciation of Northern Europe became slowly overgrown by woods, and the herds that had pastured on them gradually adapted themselves to a forest existence and spread all over Europe west of the steppes. The resulting modification of frame produced a heavy, clumsy animal some 13½ hands high, with sturdy and relatively short legs, and the face "broad, short and not bent down on the cranium, in which respect it resembles other browsing and forest-loving types of herbivora." This was the foundation of the heavy German horses of the Middle Ages and our dray horses.

Such was the horse, varied in form by its environment, which prehistoric man found about him when he first began to assert his mastery. How, or when, or where the first human savage got a colt under control, and had the wit to begin to utilise him otherwise than as venison, nobody knows, and is unimportant. The earliest recognisable human bones belong to the same period (in Europe) as that in which the true horse appears, but it is probable that man was far less dangerous to the horse than were the lions, hyenas and big wolves of those early Pleistocene forests. Judging by the remains of his feasts entombed in the floors of his cave-homes, the primitive hunter found several other large beasts an easier prey than the horse. In the valley of the Saône, in Southern France, at Solutre, there is a large cave-resort and the site of what must have been for centuries an open-air camp or summer meeting-place of the Palæolithic people, and here stands a sort of rampart about the place formed chiefly of horse bones. The French anthropologist, Toussaint, calculated that the pile represented at least 100,000 horses, and he and others believe that this indicates that horses were kept in captivity as a regular meat supply. If so, doubtless adventurous youths often climbed upon their backs. Still later is the period of the German and Swiss caves, whence have come those astonishing etchings of horses, mammoths and other creatures known to the pigmies (for so they were), who in leisure hours scratched upon ivory and bone vivid portraits of the quarry of their daily chase. These etchings, which are the oldest of human inscriptions, plainly show that the horses they knew were those of the bulky, clumsy-headed, shaggy forest type.—E. INGERSOLL, in *The Rider and Driver.*

The Dogs of France.

VIEWS OF M. LE VÉTÉRINAIRE.

In the course of a sprightly article on the French dog and "dog doctor," a correspondent to the "Woman's View" column of *The Times* says:—

"M. le Vétérinaire explained it is only within the last fifteen years that dogs have interested Frenchwomen. So little was it usual for a woman to have a dog that a lady could not walk out alone in Paris with one. It would not have been *comme il faut.* To-day, every Frenchwoman has her dog, sometimes more than one. I do not mean just a pet dog, but a real dog, and a *chien de race* for preference."

The poodle with his tricks, his ribbon bows, his comically shaven body, which made him a family jester, well loved but laughed at, has now entirely disappeared from French family life. He is "poor Toto"; no longer the fashion. The fox-terrier and the bulldog succeeded him. *Le petit fox* curled himself into bachelor armchairs, and merrily took his place in family circles. He was given now and then a part to play at the theatre. No home was complete without him. He frequently answered to an English name, Bob, Dick, or Jack. He wore a collar with bells on it, and knew very little about discipline.

The French bulldog was always, and still is, better loved of Frenchwomen than the English bull. Size has much to do with the preference. Neither the fox nor the bull are the *dernier cri* in dogs, but both are to be counted as members of the social community. They are good dogs to have in town. Serving maids and men tolerate them as being little trouble to exercise and keep clean.

FASHIONABLE DOGS.

The "fashionable" dogs are those of the Pekinese class. These pampered darlings of rich women have always had their places in boudoirs and salons. They are sometimes heavy burdens to servants and friends, but, aristocratic in temperament, they are accepted in society. They occupy silken cushions, snuggle into fur coats, sit delicately among lace, and intuitively jump into motor-cars when tired of walking. To the proletariat they are supremely indifferent. "L'Etat, c'est moi," might be their motto.

The most fashionable of big dogs is the sheep dog. A *berger Allemand* or a *berger Français* may be found in most French households. They sit with the chauffeur on the car and walk with their mistress in the Bois in the morning.

The tall graceful Persian greyhound is growing in favour and has been made popular by portrait painters, illustrators, and fashion artists. A Parisian woman with her tall white hound is a fit subject for many modern brushes.

The Irish terrier, the Sealyham, the Skye, are also at home in France, and the Cocker spaniel is valued. The collie was once a favourite, but is less so to-day. All sporting dogs are well looked on. The retriever, the pointer, and the setter go out with the guns.

AT THE DOG'S HOSPITAL.

With the appearance of the dog as a member of the social community, the profession of dog doctor became more lucrative. It is now a recognized and "respectable"

calling. A visit to a dogs' hospital in the neighbourhood of Paris is worth while. The doctor, who is also a surgeon, is a young man—keen, smart, with amazingly deft hands, a quiet but authoritative voice, and very kind eyes. He has room for about twenty patients and visits more than that number every day. He has male nurses in attendance day and night. He is a strict observer of hygienic methods, and his wards are clean and sweet smelling, well ventilated, but not draughty.

The dogs under his care look happy. They never cringe or flinch. One realizes that they are not used to hard words or rough handling. In one kennel is a black cocker, almost convalescent. The dog was sent to the hospital in a dying condition after a fight with an enormous mongrel sheep dog. In another is a delicate little Sealyham with pneumonia. A big Alsatian lies with watchful eyes in a third. There are ten, in all, in the ward, and there is no restlessness, no sign of anxiety or fear to be seen in any of the dear dumb creatures' eyes. In each kennel is a flat bowl of water and another of food.

The diet is strictly attended to, and questions are put to the owner about his dog's special tastes and preferences. There is no tyranny about "uniform," and a dog may bring his own bed and lie in it. On each kennel door is fastened a history sheet, on which is written the name of the dog, that of his owner, his illness, and the date he came into hospital.

"I have always been interested in dogs," said the dog doctor as he led us to the convalescent ward in the garden, "and I like them too." In his holland blouse, with his clean, capable hands and straight kind glance, one felt that he was not only a trustworthy friend of his patients, but a clever physician and surgeon, under whose care they would have every possible chance of getting well.

The cult of the dog in French social life, though of recent date, is well exemplified in the way "Monsieur le Vétérinaire" runs his hospital. The latest surgical and medical methods are followed, and modern hygiene prevails. He is a pioneer, but he is training men to follow in his footsteps, and his reputation for skill and kindness is high.

History of Medicine.

Trepanning With a Flint.

Several expert investigators and practitioners read papers at the International Congress of the History of Medicine.

Dr. T. Wilson Parry spoke at the Royal Society of Medicine on "The collective evidence of trephination of the human skull in Great Britain during mediæval times," and showed a remarkable series of lantern slides in illustration of his subject. The Bisley (Glos.) skull, found in 1862, had been trepanned with a flint, and thin scraping was another method of operating. The lecturer had himself used flints experimentally, and was able to show just the same sort of separation marks as those in prehistoric skulls which had been examined and photographed. The Mountstuart (Isle of Bute) skeleton had a fine necklace of jet. There were large numbers of pieces of skull which had been pierced to wear as amulets, and the operation of trepanning by primitive races had probably been performed for superstitious reasons, as a cure for epilepsy or some other complaint.

Mr. W. G. Spencer read a paper on the "Epitome" of Vesalius on vellum in the British Museum Library; Dr. Krumbhaar gave an account of the beginnings of anatomical teaching in the United States; a lady contributor, Dr. F. K. Lander, traced the history of the study of anatomy by women, and Dr. J. D. Comrie spoke of early anatomical instruction in Edinburgh.

College of Surgeons' Exhibits.

At the Royal College of Surgeons the visitors were received by the President, Sir Anthony Bowlby, and the Vice-President, Sir D'Arcy Power. Among others present were Sir Arthur Keith, Sir Humphry Rolleston (President of the Royal College of Physicians), General Sir Frederick Smith (Chief of the Army Veterinary Service), Professor Lindsay (Belfast), and many ladies.

Sir Arthur Keith conducted the company to a number of exhibits. They included the earliest artificial leg known, dating from about 300 B.C. It is of pieces of thin bronze fastened by bronze nails to a core of light wood, the fastening to the body being by means of iron bars at the upper end. There also is a rib of Robert the Bruce, fractured at a jousting match in England.—*Morning Post.*

Royal College of Veterinary Surgeons.

Result of Examinations, July, 1922.

(Continued.)

Dublin:—

Class A.

H. Bissett (Miss)
J. J. Brennan
P. C. W. Creagh
H. Cronly
*E. F. Cunningham
*S. R. Elmes
*R. Gubbins
*P. Harnett
*J. H. M. Hughes
A. J. E. Johnston
W. J. King
H. A. Logan
E. F. McCleery
T. B. McClure
A. P. McDonald
P. M. McManus
C. F. Magnier
M. A. Molloy
P. E. Mullaney
P. A. Rogan
J. F. L. Taylor
W. W. A. Taylor
J. V. Tevlin

Class B.

P. D. Baylis
J. A. Burke
H. F. F. Clarke
*F. Crowne
W. V. Earnshaw
P. J. Healy
J. P. Hegarty
E. M. Hughes
F. J. Hyland
*F. H. McDonnell
*J. McIlwaine
H. G. McShane
*J. I. Magowan
W. S. Maguire
J. A. Maybin
M. O'Connor
*L. H. B. Power
J. E. Rosborough
*S. G. Stewart
*R. Walshe

Class C.

H. Bell
*J. Bell
F. S. E. Bingham
A. D. J. Brennan
J. J. Collins
*M. Crawford
*O. T. de Villiers
H. G. Dooley
J. J. Gildea
M. Herlihy

†H. G. Lamont
E. A. McCarthy
*D. F. McCarthy
A. McFarlane
G. McWilliams
W. P. Moss
J. F. Nally
M. M. Neser
H. O'Leary
J. O'Mahony
T. Y. Ranson
*T. H. Robinson
G. Rocker
J. J. Shankey
A. L. Thompson
C. J. Van Heerden
N. Walshe
L. T. Whitby

Class D.
S. L. Black
*J. P. Camac
P. Carron
J. A. Flynn
R. H. Gardiner
A. G. Gordon
H. D. Heggarty
J. J. E. Kenny
*H. L. McConnell
P. McGlinchey
T. A. Mernagh
P. J. Nolan
R. J. Nolan
J. O'Kane
J. O'Keeffe
F. O'Leary
J. Patterson
P. M. Quille
R. W. Sainsbury
T. Treacy
E. F. Twaddle

GLASGOW :—

Class A.
J. Barclay
G. Simmins
*D. N. Walker
G. Watt
*W. Weipers

Class B.
W. Allan
D. S. Barbour
D. Brown
J. C. Dyet
A. C. Ford
L. B. A. Grace
R. Harley
A. Hunter
B. J. M. Nairn
J. McQuaker
W. C. Maitland
*R. Renfrew
A. Sillers
W. C. Smith
A. Walker
T. McWilliam

Class C.
W. C. Auld
S. J. Abbott
G. W. Begg
H. Begg
J. A. Bradley
*A. Cruickshank
A. Eccles
W. S. Gordon
J. McBinden
J. Plenderleith
J. S. Quinn
J. Sommerville
J. Stewart
A. Sutherland
J. T. Taylor
*R. Turnbull
J. Weir

Class D.
W. A. Burns
*C. A. McGaughey
J. J. Masterson

EDINBURGH :—

Class A.
J. McK. Boyd
*G. B. Brook
*D. Cameron
J. P. Cook
G. F. Elliot
P. Fisher
Wm. S. Gray
*Walter S. Gray
J. W. Griffin
S. P. Hendry
J. S. Kingston
A. McCaughan
A. K. Mitra
K. S. Nair
F. E. Peek
G. F. Pickering
G. G. Rennie
E. D. Robertson
J. A. Robertson
J. Ritchie
W. J. B. Robson
W. Scott
H. C. Watson
*A. J. Weighton
C. Weighton
H. McI. Wilson
J. McL. Laing
W. D. Macrae

Class B.
W. T. S. Atkinson
*A. Brownlee
E. A. Burgon
W. H. W. Baird
W. Cormack
E. R. Corrigal
*D. Coull
G. S. Cowin
G. J. de Wet
W. Duncan
C. E. Hall
*J. Hill
R. H. Hope
J. R. McInnes
J. D. Macbeth
H. F. McCaughan
J. J. McDowall
I. D. Macrae
J. G. C. Mitchell
J. Smith
G. Tullis
R. J. P. Watson

Class C.
H. B. Allan
W. G. Beaton
J. L. Brain
J. Carmichael
*E. R. Callender
W. Devlin
P. D. Dunn
H. M. M. Duff
J. R. Frean
*K. A. Forke
*W. H. Griffiths
E. F. Hardwick
W. J. Ironside
W. A. Ireland
P. L. le Roux
†R. F. Montgomerie
R. B. H. Murray
M. R. V. Pannikar
*G. Pfaff
J. Small
*J. L. Stewart
*G. Wilson
T. P. Young

Class D.
J. K. Bateman
H. W. Bodger
W. L. Downie
*D. Dunbar
A. E. Ferguson
E. T. Fern
A. Fulton
J. R. Haddow
T. Y. Littler
W. S. Mackintosh
A. D. McEwen
*D. L. McWhirter
W. A. R. Ogilvie
A. McK. Sievwright
G. V. Tyerman
W. M. Webster
T. J. Richardson
W. H. Wood

* Denotes 2nd Class Honours.
† Denotes 1st Class Honours.

Lieut.-Colonel G. Elphick.

DEATH OF DOYEN OF NORTH-COUNTRY VETERINARY SURGEONS.

We regret to announce the death, which took place on July 19th, at his residence, 5, Haldane Terrace, Newcastle, after a long illness, of Lieut-Colonel George Elphick, the doyen of North-country veterinary surgeons and one who was held in respect and esteem throughout the profession. "Among the agricultural population of this district," says the *Newcastle Daily Journal*, "there was no better known figure, and his demise will be mourned by a wide circle of friends who appreciated the quiet, effective way in which he did his work, his kindly nature and the sturdy independence of the man.

All his life Mr. Elphick was concerned with cattle and horses. The son of an agriculturist, he was born at Brighton in 1849 and educated at Shoreham

Grammar School. He worked for some time with his father, and then entered the Dick Veterinary College in Edinburgh. That was in 1869. In 1871 he graduated and came to Newcastle as assistant to Dr. Clement Stephenson, to whose practice he succeeded when the latter retired ten years later.

In December, 1911, a serious accident befell Dr. Stephenson while he was attending the Smithfield Show, compelling him to resign the position of Chief Veterinary Inspector for Northumberland. At the request of the County Council, Mr. Elphick took over the duties temporarily, and then an arrangement was made by which he retained charge of the Southern Division—that is south of the Coquet; while Mr. George Craik was appointed to the Northern Division.

This arrangement had scarcely come into force when a bad outbreak of foot-and-mouth disease took place—the first in the county for about thirty years—and the new inspectors were quickly brought to the realisation of the cares and responsibilities of office. Mr. Elphick was kept busy night and day for a long time in the fight against an epidemic that rapidly spread, and it argued more than ordinary stamina and energy that, at the age of 63, he was able to hold to his heavy task so consistently.

In another direction there is proof of Mr. Elphick's energy, and patriotism, too. He served for over 44 years with the Northumberland Hussars, and during the whole of that time never missed a camp. He joined the regiment as a trooper in 1871, and acted then, as he did in business, as assistant to Dr. Stephenson, who was veterinary officer. When Dr. Stephenson retired in 1878 he succeeded him in the position. With the inauguration of the Territorial Force a veterinary corps was formed, which Mr. Elphick joined with the rank of major, but he still remained attached to the Yeomanry. He served under no fewer than six commanding officers.

In addition to his regimental work Mr. Elphick did useful service as a member of the Northumberland Territorial Force Association, and more particularly as vice-chairman of the Horse and Transport Committee. He was one of the first officers in the country to receive the Territorial Decoration.

When the war broke out Major Elphick was promoted Lieutenant-Colonel and appointed to the post of Chief Veterinary Officer of the Northumbrian Division. In this capacity he raised and organised a veterinary section and hospital for the Division. His age prevented him going overseas, but throughout the war he rendered valuable service.

Other positions which Colonel Elphick filled were those of Inspector under the Swine Fever Order for the Board of Agriculture, examiner of entire horses under the Horse Breeding scheme, and examiner for the Hunters Improvement Society for the counties of Northumberland and Cumberland. He was one of the best judges of hunters, and his services were in great request all over the Kingdom.

In his younger days he was also a very fine horseman, and many were the races he won. For a long time he hunted regularly with the Tynedale and Morpeth Hounds, and he acted as honorary veterinary surgeon in connection with the Gosforth Park Races. As a Freemason, he was one of the founders of the Victoria Commemoration (Reserve Forces) Lodge, and was a Past Master of St. John's Lodge. For many years Colonel Elphick was a member of the Council of the Royal College of Veterinary Surgeons.

With the close of the war Colonel Elphick retired from business, and his practice has since been carried on by his sons, Mr. Harry S. Elphick and Mr. Clement Elphick, who had previously been his assistants for some years. They have also taken over most of the official appointments he held, Mr. Clement Elphick now being Chief Veterinary Inspector for the Southern Division of Northumberland.

Theirs is, indeed, a family of veterinary surgeons, for besides those mentioned there are two other sons in the profession—Mr. Edwin E. Elphick, who holds an appointment under the New Zealand Government, and Mr. Charles Elphick. Three of the sons, as well as the father, served in the Army during the war. The deceased gentleman also leaves a widow and two daughters to mourn his loss. Mrs. Elphick, we regret to add, is lying seriously ill at the present time."

The Funeral.

Many of his old friends of the county and the city attended the funeral at Old Jesmond Cemetery, Newcastle, on the Saturday. Canon J. Wilkinson conducted the service at the graveside.

The chief mourners were: Messrs. H. S. Elphick, C. Elphick, Edwin Elphick and Charles Elphick (sons); Mr. P. Bentham, Mr. Guy Darnell and Mr. Sidney Wade (sons-in-law); Mr. Selwyn Bentham (grandson); Mr. J. D. Walker, Dr. T. Lisle, and Dr. G. A. Atkinson.

The underbearers were the following employés: Messrs. James White, John Pender, George Allan, Richard Hogg, Ernest Redpath, and John Scott.

There was an escort of troopers from the Northumberland Hussars, bearing a wreath from the regiment the deceased had been actively associated with for nearly half a century, Captain A. Brooks and R.S.M. Hector and S.S. M. Butler being on parade.

Colonel Sidney, D.S.O., officer commanding the Hussars, and General Sir Loftus Bates, hon. colonel of the regiment, also were present.

Old friends and business associates of the deceased were noted at the graveside including Mr. Robert Donkin, Rothbury; Mr. E. F. Brewis, Blagdon; Mr. W. Lawson, V.S., Rothbury; Mr. Cuthbert Snowball; Mr. George Burtchby, Harrogate; Mr. R. Emerson, the Mount, Corbridge; Mr. George Benson, representing High Gosforth Park Co.; Mr. J. Archer, the Riding, Hexham; Mr. Thrale C. Martin, Newcastle; Mr. H. F. Wilson,

Marden; Mr. G. S. Charlton, Newton-on-the-Moor; Mr. George Baynes, Riding Mill; Mr. W. Dotchin, V.S., and Mr. W. Marshall, Newcastle; Mr. Thomas Parker, V.S., Newcastle; Mr. F. Pickering, V.S., Hexham; Mr. Thomas Bowser, Newcastle; Mr. R. E. Robson, Newcastle; Mr. W. L. Bentham, Newcastle; Mr. W. Bentham, jun.; Mr. George Lisle, Newcastle; Mr. Thomas Hindmarsh, Newcastle; Mr. Thomas Hindmarsh, Walwick Grange; Mr. J. Aitken, V.S., Chester-le-Street; Mr. T. Harper, V.S., North Shields; Mr. T. Murdie, Brunton Bridge; Mr. James Black, Gosforth; Mr. Thomas Clavering, Low Willington Farm; Mr. R. Goodfellow, Newcastle; Mr. N. Thompson, Old Benwell; Dr. T. Russell, Trimdon Grange; Mr. William Jones, Kelloe Hall; Mr. J. W. Watson, Kelloe Hall; Mr. D. F. Appleby, representing Mr. Alfred Appleby, Newcastle; Mr. R. Reid, Backworth; Mr. F. Finney, V.S., Newcastle; Mr. T. Dodds, Newcastle; Mr. J. Scott, V.S., Morpeth; Mr. W. Baty, representing John Baty, Heathery Shank, Fenham; Dr. T. Blandford Watson, West Hartlepool; Mr. William Woodcock, Mr. E. Charlton, Newcastle; Mr. T. R. Jarvie, V.S., Gateshead; Mr. Geo. Dudgeon, V.S., Sunderland; Mr. J. Davidson, V.S., Newcastle; Mr. Hammersley Wilson, Newcastle.

The wreaths included tokens from the employés of George Elphick and Son, the North of England Veterinary Medical Association; the National Master Farriers Association, and the Northumberland Yeomanry.

The funeral arrangements were made by Messrs. James Coxon, Newcastle—*Newcastle Daily Journal.*

Obscure Lesions in Tuberculosis.

Without doubt it is seldom that veterinarians applying the various tuberculin tests do not anxiously await the abattoir report on findings, and it is but fair to say that the men assigned to *post-mortem* inspection are fully aware of the co-operative part they are taking in this work when called upon to verify, if possible, through thorough inspection, the results obtained by men in the field. With this in mind, therefore, one can easily understand the seriousness with which the *post-mortem* inspector approaches his work and how reluctantly he reports "no lesions" following a thorough examination of viscera and carcase.

In the routine work of inspection there arises at times evidence to prove that tuberculosis in its macroscopic appearance undergoes changes differing from the form usually presented to the inspector; in fact, there are many times when the aid of the laboratory is deemed advisable in reaching a diagnosis. I have in mind an animal which had reacted and upon *post-mortem* showed in addition to the usual visceral lesions large and small tumours in all the muscles of the carcase. These tumours when incised revealed nothing characteristic of tuberculosis, yet upon laboratory examination were pronounced tuberculous growths. The parasitic invasion of lymph glands will sometimes cause a condition simulating tuberculosis, but the characteristics of tuberculosis being lacking, one can usually differentiate without fear of mistake.

In the examination of enlarged joints in cattle it appears that mistakes in diagnosing this condition as tuberculosis have been made, as material from joints clinically pronounced tuberculous have often been forwarded to the laboratory only to receive a negative report. I do not say that tuberculous joints are not found; in fact, we have to report many of them; but I wish to caution against a positive clinical diagnosis in these cases owing to the many conditions which cause lesions resembling tuberculosis, especially in the region of the femoro-tilbia joint.

Inflammation of serous membranes will many times cause a condition resembling tuberculosis, while acute lesions of the proliferative type will, through error, be dismissed as of no consequence; hence the need of great care in considering these cases.

In the examination of reactors it is interesting to note the various locations of primary lesions. For example, a renal lymph gland, an iliac, a popliteal, an ischial, a precrural, prescapular hemo-lymph gland draining a hide lesion, the glands of the head and cervical region, the posterior mediastinal between the caudal lobes of lung, the inguinal glands of bulls and mammary lymph draining the udder with ofttimes evidence present in structure of udder; those mesenteric glands adjacent the ileocecal valve; also various bone structures, especially the dorsal region of the vertebral column. In the selection of specimen tissues for laboratory examination in those cases in which no visible lesions are, it is well to include those glands of the mesenteric chain adjacent the ileocecal valve, regardless of whether suspicion is directed toward them, also any lymph glands showing enlargement and swelling with either unusual content of fluid or a hyperæmic condition bordering on a plum red.

From laboratory data it is evident that with the aid of the microscope confirmation of reactions may be obtained in cases where macroscopic evidence was lacking.

A condition of fat necrosis is found in cavities of the body, also necrosis of the bones, both of which must be differentiated from tuberculosis. Another example is lime deposits in the region of the sternum and the ilium, which upon section reminds one of dried cream-coloured paint.

Much can be written about the prevalence of hide lesions, which often present the characteristics of visceral lesions and are usually found at points where injuries have been received followed by manure infection, the fore and hind legs being favourable sites. On the hind legs the infection can often be traced to the small lymph nodes leading to the popliteal gland and its course followed into the large lymph system, but in many cases hide lesions are restricted to the inner side of hide and fascia and appear not to involve the muscle proper, while in other cases the muscle is unmistakably infected, the evidence pointing to a strictly local lesion.

Attention is invited to the fact that not all lesions of the hide are verified by the laboratory as tuberculosis, there being a condition caused by pyæmic infection which undergoes the same degenerative process, revealing upon incision inspissated pus and calcification. These various lesions of the hide bear such a striking resemblance that I consider it wise to make a conditional diagnosis and ask of the laboratory a confirmatory report.

The results attending the examination of reactors must be judged by the time the inspector can give to the work, and the importance attached to this work is evidenced by the unusual preparations being made to handle reactor cattle. Thus in many of the abattoirs of the country two or more men are assigned the task of further inspecting those cases which in the ordinary routine revealed no lesions. This supplementary inspection is many times rewarded through the finding of a lesion in some obscure part of the carcase, and proves an incentive for the inspector to bend every effort toward verifying the results obtained by the field men in the intensive campaign now being waged against bovine tuberculosis.—C. C. Conley, *in the Journal of the American V.M.A.*

Clinical and Case Reports.

The Editor will be glad to receive from members and others contributions to this column of reports of interesting cases.

Grass Sickness in Horses?

By J. W. Hall Masheter, M.R.C.V.S.,
Newnham-on-Severn.

Case I. *Subject.*—A half-strain 8 year-old mare, brought to my infirmary on Sunday, 18th June, suffering from an attack of colic.

History.—On the 17th she was working in the hayfield, and was not her usual lively self, but did not show any signs of pain—simply dull. On the evening of that day she showed slight pain and some tympany, and the owner gave a pint of linseed oil. As there was no response to this next morning, and as she seemed in the same condition, he brought her down to me.

I took it to be simply a mild case of impaction, and gave him a couple of colic draughts, with instructions to let me know in the evening as to how she was. He reported about 10.30 p.m. that she was no better—simply standing with her head down, very sleepy and occasionally trying to vomit.

Symptoms.—I went immediately to see her and found her standing quietly, with head down, eyelids half-closed. Occasionally would paw with the near fore foot, and then settle down quietly again. Sub-maxillary pulse unobtainable—artery hard and seemingly empty. Radial pulse quick and hard and about 120. Temperature 101 deg. Fah. Salivation, paralysis of glottis, eructations of foul-smelling gas and fluid ingesta, borbyrigmus, but no passing of flatus by the anus—otherwise complete stasis of the bowels—patchy sweating at the elbow, flank, and underneath the tail—trembling of the muscles of the near shoulder.

Treatment.—Hypodermic injections, as on account of the paralysis of the glottis the animal was unable to swallow. Physostigmine (two injections), digitalin, sparteine, strychnine—but there was no response to this, and the mare simply stood quietly until she died at 2.30 a.m. I did not make a *post-mortem*.

Case II. *Subject.*—A Shire type gelding, three years old. On the morning of Monday, the 26th June, this same client called to say that he had another case exactly like the mare.

Symptoms.—Pulse—sub-maxillary—I could not feel the artery, being hard and very fine; radial pulse about 120; temperature 102.2° F.; salivation and paralysis of glottis; complete stasis of bowel; eructations—these latter like a case of choking (contraction of the neck muscles accompanied by a squeal); patchy sweatings at elbow, flank, inguinal region, and round the anus; standing perfectly quiet, head depressed, eyes partly closed and seemed very sleepy; woke up at the slightest noise, but settled down immediately to his previous sleepy state. Very tympanitic. Rectal examination showed tympany of the small bowel and the colon to be simply packed solid. Rigors shoulder and hip.

Treatment.—Physostigmine and cardiac tonic hypodermically. Tried to give him a dose of whisky, but as he could not swallow this had to be given up. Died quietly at 6 a.m. of the 27th.

In this case on the Friday previous, the 23rd, this horse seemed to have a difficulty in passing his urine, stretching out both fore and hind limbs until abdomen almost touched the ground.

Also on Sunday, the 25th, a passer-by commented on the sleepy look this colt had—so that actually he had been ailing since the 23rd June.

Post-mortem.—Stomach enormously distended, by fluid ingesta, and gastritis very severe. Enteritis severe along the whole length, and on coming to the cæcum and colon these were simply packed solid; in fact, if I had set them on end they would have stood by themselves.

Case III. *Subject.*—A half-strain mare, 9 years old. Thursday, 29th, at the adjoining farm. Had been working on the previous day and showed no signs of being unwell.

I need scarcely recapitulate the symptoms of this case, as they were, after the first few hours, exactly similar to the others; but in this case there was acute pain and sweating in the early part of the attack, which, however, soon settled down to the drowsy appearance, running-down pulse, etc., and death two days later.

Treatment.—This was similar, and in the early stages, in response to the physostigmine there were a few small evacuations of hard pellets. In this case I offered the mare water in a pail, but on account of the paralysis of the throat, although she was very anxious to drink, she could not swallow, but shoved her nose to the very bottom of the bucket. *Post-mortem* revealed the distended stomach with fluid contents, gastritis, enteritis, impaction of cæum and colon (but not to the extent shown by the others where there was no response to the physostigmine).

These cases occurred on old pasture land which, I think, has never been cultivated, and were on adjoining farms. The breathing in each case was very subdued—a very quiet inspiration and a rather more energetic expiration.

Needless to say I had not seen a case of "grass sickness," and thought the first case was simply a bad impaction, but when the others came along it "gave one furiously to think."

I turned back to Mr. Nairn's admirable communication in the "Record" and to Mr. Spruell's graphic account of the symptoms, etc., and was

struck by the exact similitude to the cases as they occurred in Scotland and the cases I had just had the misfortune to experience.

Hence the designation at the head of this report.

Womb Inversion Questions.

By EUSTACE J. LAINE, M.R.C.V.S., Guernsey.

In recording the following, in my experience, unique case of inversion of a cow's womb, I do so more in search of knowledge, than to bring before the profession, what happened to be a partially successful case.

At 4 p.m., June 14th, I received a telephone message from Sark asking if I would go over the following day to attend a Guernsey cow that had "thrown her womb." (This is approximately a translation of the condition described over the 'phone).

As requested, I proceeded to Sark at 10.30 a.m., June 15th, arriving at the cowshed at about noon.

Subject. Guernsey cow. Third calving. The owner was a fisherman and the *cowshed* the dirtiest hovel imaginable, where a person less than 4 ft. 6 ins. *might* stand upright without cracking his skull.

History. Cow calved on the morning of June 7th, giving birth to a twin. She did not cleanse. Entering the cowshed at 5.30 a.m., June 14th, the owner found the cow apparently exhausted and with "her womb out." He at once called in the medical practitioner, who generally attends to ailing cattle and the latter, finding he could do nothing, gave directions *re* keeping the womb clean and warm and advised telephoning for me.

Manipulation convinced me that to return the womb would be both difficult and useless and seeing the state of the patient I decided on amputation which was done in the usual manner. I prescribed brandy alternated with ammon. carb. and nucis vom. every hour, and now the cow is out of danger.

I do not record the case as a success but in order to ask whether many or any of the readers of your valuable Journal have experience of inversion of the womb so long as seven days after calving and, secondly, if anyone has been able to return a womb after (at least) 36 hours inversion.

Duodenal Ulcer in the Dog.

F. J. TAYLOR, M.R.C.V.S., Bath.

For the second time I have a typical case of ulceration of the duodenal tract to describe.

Subject: A pedigree wire-haired terrier, fourteen months old.

History: Was apparently in perfect health when inoculated for distemper with an approved vaccine.

Symptoms, which form the interesting features of this case: three weeks after inoculation subacute manifestations of distemper were shewn by a slight husky cough, and the typical eczematous rash inside the thighs, a depraved appetite, alternated with disinclination to feed at all, but he continued to be very lively, and game to play, with, however, a tendency easily to tire, and quarrel with his companions. These symptoms passed away in about a week and he became an almost normal animal, but refused to go long distances, showing at times extreme dullness, and lassitude. He strongly objected to being picked up suddenly. An occasional jelly-like diarrhœa, with no blood, was observed about every third day, otherwise the dog seemed quite normal, but as several weeks elapsed the pain on manipulation in the duodenal region became more pronounced, the lassitude increased and diminution in weight induced me to form a definite opinion that ulceration of the duodenum was the cause of these somewhat obscure symptoms and I destroyed him with morphia and chloroform.

On post-mortem examination all organs were quite healthy apparently, except the duodenum which was much thickened and had seven ulcers in various stages upon its mucous surface, two of which were almost perforating the serous coat.

The stomach itself was normal, and there was no ulceration of the pylorus; the ductus choledochus, and ductus pancreaticus were almost occluded by thickened membrane, but the organs seemed unaffected.

I am of opinion that dogs suffer from duodenal ulcer to a greater extent than is at present diagnosed, and I should value other opinions on this point.

A peculiar and distinctive feature, to my mind, was that this animal (which was one of my own, and therefore I had every facility for constantly observing symptoms) never rested like other dogs, and always seemed uncomfortable, slightly whining at times, and when the stomach was empty suffered from acute flatulence, and evident pain on pressure. This was usually two, to three hours after food. On being again fed he became once more a normal dog, quite bright and inclined to play.

All treatments in regard to peptonized foods, meat extracts, and sedative medicines were adopted, but no treatment was of permanent benefit.

For the descriptive anatomy and diagrams of this case refer to "Bradley's Dissection of the Dog," pages 36 and 37.

Abstracts and Reviews.

Mites Injurious to Domestic Animals.

This pamphlet which is one of the Economic Series issued by the Trustees of the British Museum deals with the principal families of mites. The Sarcoptidae, Analgesidae, Listrophoridae, Tyroglyphidae, of the sub-order Sarcoptoidea; the Demodicidae of the sub-order Vermiformia; the Trombidiidae of the sub-order Prostigmata; the Tarsonemidae of the sub-order Heterostigma and the Gamasidae and Holothyridae of the sub-order Mesostigmata. It is hoped that a pamphlet dealing with ticks may be issued later.

The description of the parasites is clear and concise. The illustrations, of which there are eighty-five, are unusually distinct and constitute the chief value of the work.

At the end of the pamphlet several useful hints are given for mounting mites for microscopic examination.

The majority of the parasites which are described are frequently met with in veterinary practice, others are rarely seen.

The pamphlet will prove of considerable interest and value both to students and practitioners.

Application to the Museum direct for this pamphlet should be accompanied by a remittance including postage.

Written communications respecting it should be addressed to the Director, British Museum (Natural History), Cromwell Road. London, S.W. 7.

Mites Injurious to Domestic Animals (with an Appendix on the Acarine Disease of Hive Bees). By Stanley Hirst, Assistant Keeper, Department of Zoology, British Museum (Natural History). London. Printed by Order of the Trustees of the British Museum, 1922. Price 3/–].

Sunshine does not Sterilise Tuberculous Sputum.

Experiments conducted in Switzerland, at Lauzanne, demonstrate that sputum expectorated on the roadway, under the usual conditions, even when exposed in the sun in summer for from two to fifty-two hours, or during nine successive days, induced the development of tuberculosis in guinea-pigs inoculated with the material. All the experiments gave positive results, in one instance after eleven days' exposure to sunlight. When the sputa had been deposited on snow beaten down hard in the roadway the inoculations were all negative, except in one instance, which had been exposed to sunshine for only thirteen hours. It is evident that the sterilising action of sunshine is practically negligible for clumps of sputum, such as patients expectorate.—H. Tecon (*Paris Médical*, 1919, 10, 33; *J. Amer. Med. Assoc.*, 1920, 74, 634).

A Kabyle Dog Enzootic.

An epizootic of "Boukchem" ("nose disease") raged among dogs in Constantine (Algeria) from December, 1919, to April, 1920. The condition, which is exceedingly contagious in the early stages and invariably fatal for the Kabyle dog, resembles the distemper of Algerian puppies rather than rabies, though it differs from the former in that it is common to all ages, and the pustules seen in distemper do not occur. The onset is characterized by running from the nose, which develops into a mucous and then a muco-purulent discharge, accompanied by intense irritation in the nasal cavities. Later on extensive disturbance of the nervous system is generally observed; the hind legs frequently become paralysed, and in most cases acute hyperæsthesia of the neck prevents the wearing of a collar. The animal preserves its intelligence, eats and drinks, and shows no sign of anger. Death occurs on an average in from three to twenty days; in rare cases it is delayed for four or five months, or even longer, the dog remaining partially paralysed. In a less common type of the disease the respiratory system is particularly affected. At autopsy tumours containing *Spiroptera sanguinolenta* were seen along the intrathoracic œsophagus in nearly every case. The disease would seem (as corroborated by experiment) to be confined to the canine race, and in its fatal form to attack Kabyle dogs almost exclusively. When contracted by European dogs its course is mild; in half-breeds it is of intermediate severity. Experiment failed to throw any light upon the method of transmission, which, however, is apparently not by bite.

"*Boukchem*"—*An Enzootic Disease of Kabyle Dogs* (A. Donatien and G. Espérandieu).

Pig Trypanosomiasis Epidemic.

An epidemic of trypanosomiasis which broke out in a wooded valley of Mamou during the rainy season carried off thirteen out of twenty-two pigs in six weeks. The symptoms appeared suddenly and developed with great rapidity, death usually occurring in from twenty-four to forty-eight hours and sometimes in twelve. The organism was a trypanosome measuring from 12 to 14 or from 21 to 25 microns in length and from 1 to 1½ in breadth, with long flagella; a few short, broader forms showed a short flagellum. It resembled *T. pecaudi* or *T. brucei* more nearly than *T. dimorphon* or *T. cazalboui*. The parasite multiplied so quickly that at death the animal's blood was practically a pure culture of trypanosomes and the red cells had all disappeared. Tartar emetic and orpiment, or a mixture of the two, proved useful as remedies if administered at the onset of the disease.

—*Trypanosomiasis of the Pig in French Guinea* (E. Aldigé).

Foot-and-mouth disease seems at last to have been stamped out in England, no case having been reported since the end of June. The total number of outbreaks up to that date was 1,124.

Notes and News.

The Editor will be glad to receive items of professional interest for these columns.

Veterinary Research Scholarships.

The Ministry of Agriculture and Fisheries offers this year two Research Scholarships in Veterinary Science, of the value of £200 each per annum and tenable for three years from the 1st October next.

The Scholarships are open to candidates who have obtained the diploma of the Royal College of Veterinary Surgeons, or who have shown evidence of proficiency in medicine or other relevant branch of science, and applications will be received up to the 15th August next on the prescribed form, of which copies may be obtained from the Ministry at Whitehall Place, S.W. 1.

Bay Horses at Buckingham Palace.

Since the departure from the Royal Mews at Buckingham Palace of the famous creams in 1919 and the blacks in the early part of last year, the whole of the King's stud is represented by bays, all of them being 17 hands and over. Bognor and Ancaster, who won first prize at last year's International Horse Show, form one of many fine pairs for coach and carriage work. Then there is Swinton, whom his Majesty rides in the Row; Paris, who is nineteen years old, but, with his mate, aged fifteen, can still trot from the Grand Entrance at Buckingham Palace to Paddington Station in thirteen minutes; and a team of four perfect animals, which are accustomed to cover the journey from Windsor to Ascot in thirty minutes. In another stall is found Anzac, a war veteran, presented to the Prince of Wales on the Western Front, and then there is Pickering, familiarly known as Tom, the leader of the Escort. Pickering is one of the most important occupants of the Mews, for he has been specially trained to trot so many paces to the minute, and the timing of all the Royal processions actually depends on him. So perfect is Tom's automatic precision of step that it is possible to judge the time an escort takes from one point to the other almost to the second.

A solitary exception to the rows of giant bays is the King's mountain pony Basuto. This little animal, which was presented to the King by a native chief, is ridden by his Majesty when shooting on the moors, and is so sure-footed that the grooms believe he could walk on a tight-rope.—*Morning Post.*

National Milk Conference.

The following is the programme of the National Milk Conference to be held in the Council Chamber at the Guildhall (by kind permission of the Corporation of the City of London) on Monday, October 16th, Tuesday, October 17th, and Wednesday, October 18th, 1922.

SESSION 1.—MONDAY MORNING, October 16th, 10—1 p.m.

(*a*) BREED OF CATTLE IN RELATION TO: (1) QUANTITY; (2) CHEMICAL COMPOSITION; (3) COST OF MILK PRODUCTION.
Reader of Paper: JAMES MACKINTOSH, ESQ., O.B.E., N.D.A., N.D.D.

(*b*). THE EFFECT OF FEEDING OF DAIRY CATTLE IN RELATION TO THE COST OF MILK PRODUCTION.
Reader of Paper: G. H. GARRAD, Esq., N.D.A., Agricultural Organiser for Kent.

SESSION 2.—MONDAY AFTERNOON, October 16th, 2.30—5.30 p.m.

(*a*) CONTAGIOUS ABORTION AND OTHER DISEASES OF CATTLE.
Reader of Paper: SIR STEWART STOCKMAN, M.R.C.V.S. Chief Veterinary Officer and Director of Veterinary Research, Ministry of Agriculture and Fisheries.

(*b*) THE PRODUCTION OF CLEAN MILK.
Reader of Paper: F. ARNOLD LEJEUNE, Esq.

SESSION 3.—TUESDAY MORNING, October 17th, 10–1 p.m.

(*a*) BOVINE TUBERCULOSIS AND ITS RELATION TO MAN.
Reader of Paper: A. STANLEY GRIFFITH, Esq., M.D., D.P.H., R.C.P.S., Research Bacteriologist to the Medical Research Council.

(*b*) THE TUBERCULIN TESTS.
Reader of Paper: CAPTAIN S. R. DOUGLAS, I.M.S. (ret.), F.R.S., Chairman of the Tuberculin Committee, Medical Research Council.

SESSION 4.—TUESDAY AFTERNOON, October 17th, 2.30—5.30 p.m.

(*a*) VARIATION IN THE CHEMICAL COMPOSITION OF MILK.
Reader of Paper: CHARLES CROWTHER, Esq., M.A., PH.D.

(*b*) HANDLING AND DISTRIBUTION OF MILK.
Reader of Paper: JOHN ROBERTSON, Esq., C.M.G., O.B.E., Medical Officer of Health, Birmingham.

SESSION 5.—WEDNESDAY MORNING, October 18th, 10—1 p.m.

(*a & b*) PASTEURISATION AND OTHER METHODS OF TREATING MILK.
Readers of Papers: CHARLES NORTH, Esq., M.D., of New York.
PROFESSOR GEORGES DREYER, M.A., Department of Pathology, University of Oxford.

SESSION 6.—WEDNESDAY AFTERNOON, October 18th, 2.30—5.30 p.m.

(*a*) THE FOOD VALUE OF MILK AND ITS CARE IN THE HOME.
Reader of Paper: DR. ROBERT HUTCHISON.

(*b*) EDUCATION OF THE PUBLIC AND OF THE DAIRY INDUSTRY IN REGARD TO MILK.
Reader of Paper: SIR A. DANIEL HALL, K.C.B., F.R.S., Chief Scientific Advisor, Ministry of Agriculture and Fisheries.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.
All correspondence must bear the name and address of the contributor for publication.
The Editor does not hold himself responsible for the opinions of his correspondents.

The Travelling Hospital for Animals.

To the Editor *Veterinary Record.*

DEAR SIR,

Probably many of your readers have seen the picture of a "Travelling Hospital for Sick Animals," which appeared in the *Daily Mail* on July 13th and 22nd. This Caravan dispensary is stated to be in charge of a veterinary surgeon and lecturer and to be travelling through Essex. It was at Brentwood on July 21st. Free treatment is given, it was also stated.

It would be of interest if any of your readers could give information as to the activities of this dispensary, as to who is responsible for it and who is the veterinary surgeon and lecturer. I feel sure such information would be of particular interest to the members of the Eastern Counties Veterinary Medical Association, in whose district this caravan is apparently working.

Yours faithfully,
G. H. LIVESEY.

CHURCH ROAD, HOVE.
July 23rd, 1922.

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaught'd as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Week ended 15th July, 1922 ...	...	...	7	11	...	...	...	...	7	8	...	28	8
Corresponding Week in 1921	1	...	5	5	...	...	1	1	30	38	2	24	14
Corresponding Week in 1920	...	...	4	7	...	225	...	...	48	80	1	29	11
Corresponding Week in 1919	4	...	5	5	...	...	...	...	82	152	3	68	31
Total for 28 weeks, 1922 ...	1	...	316	359	1124	54902	1	1	764	1121	413	698	275
Corresponding period in 1921	22	1	302	365	41	2888	7	15	1586	2461	397	748	238
Corresponding period in 1920	4	...	235	277	65	8311	10	17	2783	2747	286	1248	483
Corresponding period in 1919	119	3	106	142	19	1033	14	40	3638	7076	217	1163	504

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

IRELAND.													
Week ended 15th July, 1922 ...	...	...	...	...	...	...	...	...	Outbreaks 1	2	2	15
Corresponding Week in 1921 ...	...	...	...	...	...	...	...	...	2	5	4	17
Corresponding Week in 1920 ...	...	...	...	...	...	...	...	...	2	1	...	...
Corresponding Week in 1919 ...	...	...	...	...	...	...	...	...	3	2	...	...
Total for 28 weeks, 1922	1	1	...	...	...	...	...	...	67	130	149	832
Corresponding period in 1921 ...	...	...	7	77	...	...	...	...	54	148	45	264
Corresponding period in 1920 ...	1	1	...	...	...	...	1	3	77	153	6	22
Corresponding period in 1919 ...	...	...	...	...	...	...	1	1	108	157	18	60

NOTE.—The figures for the current year are approximate only.